

CLAIMS:

1. Device for the *in vivo* determination of the concentration of a PET tracer in blood, including
 - an image-producing device (5, 6) for the locally resolved depiction of a region of the body;
 - 5 - a TOF-PET unit (3a, 3b) for recording the concentration of the tracer in a predetermined volume element;
 - a data processing unit (7) which is coupled to the image-producing device (5, 6) and the TOF-PET unit (3a, 3b) and is arranged to set the TOF-PET unit (3a, 3b) in such a way that the volume element (2) that is recorded with this lies in a body volume that is filled with blood, wherein the spatial position (r) of the body volume is determined with the aid of the image-producing device (5, 6).
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2. Device as claimed in claim 1, characterized in that the TOF-PET unit comprises two γ detector elements (3a, 3b) that lie opposite one another, and the
 - 15 corresponding evaluation electronics unit for recording the times of flight of annihilation quanta (γ_1, γ_2).
3. Device as claimed in claim 2, characterized in that the effective area of each detector element is approximately 10 mm^2 to approximately 400 mm^2 .
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4. Device as claimed in claim 1, characterized in that the image-producing device includes an MRI device and/or an X-ray projection device (5, 6), in particular an X-ray computer tomography device.
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5. Device as claimed in claim 1, characterized in that it includes a PET device (4) for preferably three-dimensional recording of the distribution of the PET tracer in a body region.

6. Device as claimed in claim 1, characterized in that the data processing unit (7) is set up to segment a body volume that is filled with blood into images (A) produced by the image-producing device (5, 6).

5 7. Device as claimed in claim 1, characterized in that it includes a display device (8) for depicting illustrations (A) that have been produced with the image-producing device (5, 6), as well as input means (9) for interactive selection of a body volume in these images (A).

10 8. Device as claimed in claim 1, characterized in that the body volume filled with blood lies in the aorta or in the left ventricle of the heart.

9. A method for the *in vivo* determination of the concentration of a PET tracer in the blood, comprising the steps of:

- 15 - production of at least one locally resolved image (A) of a body region;
- determination of the spatial position (\mathbf{r}) of a body volume filled with blood on the basis of the image produced (A);
- recording of annihilation quanta (γ_1, γ_2) coming out of the body volume, taking account of their times of flight.

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10. A method as claimed in claim 9, characterized in that a dynamic, preferably three-dimensional PET recording of a further body region takes place, and that the data obtained here are combined with the established concentration of the PET tracer in the blood.